

What is claimed is:

1. A spinal implant insertion adjustment instrument for manipulating and reorienting a spinal implant made of bone inserted in the intervertebral disc space of a spine, the disc space defining a plane, the implant for being inserted into the disc space in
5 a range between the anterior to lateral approaches in the plane and having a bore therein of a given smooth surface diametrical dimension and longitudinal extent, the instrument comprising:

an elongated shaft defining a first longitudinal axis, the shaft having a proximal end and a distal end;

10 a handle at the distal end for manipulating the shaft; and

an implant manipulating substantially smooth surface implant engaging member extending from the proximal end, the engaging member defining a second longitudinal axis at an angle in the range of at least 0° to a maximum inclination relative to the first longitudinal axis, the engaging member being dimensioned for
15 matingly engaging the implant bore and for manipulating the implant in the plane of the disc space in response to a force on the handle.

2. The instrument of claim 1 wherein the implant bore and the implant engaging member are each circular cylindrical.

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3. The instrument of claim 2 wherein the implant engaging member diametrical dimension is dimensioned to be closely received in the implant bore to minimize stress concentration of the engaging member against the implant bore surface.

5 4. The instrument of claim 2 wherein the implant engaging member has an axial extent and a relative diameter to the diameter of the implant bore such that the implant displaces in unison with the implant engaging member in response to a displacement force on the handle.

10 5. The instrument of claim 1 wherein the implant engaging member and the bore have substantially the same cross sectional shape for the length of engagement therebetween.

6. The instrument of claim 4 wherein the implant engaging member is closely
15 received in the bore to minimize impact concentrated acceleration forces on the implant by the instrument.

7. The instrument of claim 1 wherein the shaft has a first portion extending along said first longitudinal axis and the a second portion extending along said second
20 longitudinal axis, the implant engaging portion forming an extension of said second

portion.

8. The instrument of claim 7 wherein the shaft has a first transverse dimension and the implant engaging portion has a second transverse dimension smaller than the
5 first transverse dimension.

9. The instrument of claim 1 wherein the implant engaging portion has an end tip surface distal said shaft, the end tip surface being rounded.

10 10. The instrument of claim 9 wherein the end tip surface is spherical.

11. The instrument of claim 1 wherein the implant engaging portion has an end tip surface distal the shaft and an outer surface, the end tip surface being planar and transverse to the second axis and coupled to the engaging portion outer surface by
15 a curved portion.

12. The instrument of claim 1 wherein the second axis is oriented in the range of about 30-70° to the first axis.

20 13. An instrument for manipulating and reorienting a spinal implant inserted in the

intervertebral disc space of a spine, the disc space defining a plane, the implant for being inserted into the disc space in a range between the anterior to lateral approaches in the plane and having a circular cylindrical smooth surface bore therein of a given diametrical dimension and longitudinal extent, the instrument
5 comprising:

- an elongated shaft defining a first longitudinal axis, the shaft having a proximal end and a distal end;

- a handle at the distal end for manipulating the shaft;

- a shaft extension extending from the proximal end defining a second
10 longitudinal axis inclined relative to the first longitudinal axis; and

- an implant manipulating substantially smooth surface implant engaging member extending from the shaft extension a second longitudinal extent, the smooth surfaced implant engaging member being dimensioned for matingly engaging the implant bore for manipulating the implant in the plane of the disc
15 space in response to an impact force on the handle to minimize damaging stress concentration on the implant in the bore.

14. An instrument for manipulating and reorienting a spinal implant inserted in the intervertebral disc space of a spine, the disc space defining a plane, the implant for
20 being inserted into the disc space in a range between the anterior to lateral

approaches in the plane and having a circular cylindrical smooth surfaced bore therein of a given diametrical dimension and longitudinal extent, the instrument comprising:

an elongated shaft defining a first longitudinal axis, the shaft having a
5 proximal end and a distal end;

a handle at the distal end for manipulating the shaft;

a shaft extension extending from the proximal end defining a second longitudinal axis inclined relative to the first longitudinal axis; and

an implant manipulating circular cylindrical substantially smooth surface
10 implant engaging member extending from the shaft extension a second longitudinal extent, the circular cylindrical smooth surfaced implant engaging member being dimensioned along said second longitudinal extent for matingly engaging the implant bore over at least a portion of the first longitudinal extent, the instrument for manipulating the implant in the plane of the disc space with minimum stress
15 concentration on the implant in the bore in response to an implant displacing impact force on the handle.

15. An instrument and spinal bone implant for insertion into the intervertebral disc space of a spine, the instrument for manipulating and reorienting the implant after insertion into the disc space, the disc space defining a plane, the instrument and
20 implant comprising:

a bone implant having an anterior end surface and a posterior end surface defining an anterior-posterior axis, a superior surface for bearing against a first vertebra and an inferior surface for bearing against a second vertebra defining the disc space, the implant having a bore therein of a given orientation relative to the anterior-posterior axis, the bore having a smooth surface and a diametrical dimension and a longitudinal extent between and in a direction generally along and spaced from said superior and inferior surfaces in said given orientation; and

said instrument for manipulating the implant at said bore comprising:

an elongated shaft defining a first longitudinal axis, the shaft having a proximal end and a distal end;

a handle at the distal end for manipulating the shaft; and

an implant manipulating substantially smooth surface implant engaging member extending from the proximal end, the engaging member defining a second longitudinal axis inclined relative to the first longitudinal axis, the engaging member being dimensioned for matingly engaging the implant bore to minimize stress concentration on the implant in the bore and damage to the implant in the bore and for manipulating the implant in the plane of the disc space in response to a manipulation force on the handle.

16. The instrument and spinal implant of claim 15 wherein the bore is offset from

said axis.

17. The instrument and annular spinal implant of claim 15 wherein the bore is inclined at an angle to the axis.

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18. The instrument and annular spinal implant of claim 15 wherein the bore is blind.

19. The instrument and spinal implant of claim 15 wherein the implant has a central opening transverse to the axis and in communication with the superior and inferior
10 surfaces, the bore extending through the implant into communication with said opening.

20. The instrument and spinal implant of claim 20 wherein the bore and instrument have mating surfaces that are closely spaced.

15 21. A spinal bone implant comprising:

a body made of bone and having superior and inferior surfaces for bearing against respective adjacent vertebrae defining a disc space therebetween, the body defining a plane and having spaced respective anterior and posterior end surfaces defining an anterior-posterior axis in the plane, the body having a bore in
20 communication with an outer peripheral surface at the anterior end surface and

extending in the region between the inferior and posterior surfaces, the bore being at least one of inclined at an angle to the anterior-posterior axis or offset relative to the anterior-posterior axis.

5 22. The implant of claim 21 wherein the bore is blind.

23. The implant of claim 21 wherein the implant has a central opening in communication with said inferior and superior surfaces, the bore being blind and extending in a direction parallel to the inferior and superior surfaces.

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24. The implant of claim 21 wherein the inferior and superior surfaces are inclined relative to each other to mate with the lordosis of the spine.

25. The implant of claim 21 wherein the implant has a central opening in
15 communication with said inferior and superior surfaces, the bore being in communication with the anterior end surface and the central opening.

26. The implant of claim 21 wherein the implant has an outer peripheral wall surface, the outer peripheral wall surface having a curved portion and a flat portion,
20 the flat portion being located on said axis at said anterior end of the implant.

27. The implant of claim 26 wherein the bore is in communication with said flat surface portion.

5 28. The implant of claim 26 wherein the bore is inclined relative to the flat surface portion.

29. The implant of claim 26 wherein the bore is offset from said axis.

10 30. The implant of claim 21 wherein at least one of the inferior and superior surfaces are roughened to minimize backing out of the implant from between the vertebrae and at least one of the inferior and superior surfaces is inclined relative to the axis.

15 31. The implant of claim 21 wherein the body is made of a section of the diaphysis of a long bone.

32. The implant of claim 21 wherein the body is cortical bone.

20 33. In combination:

a spinal bone implant manipulating instrument comprising:

an elongated shaft defining a first longitudinal axis, the shaft having a proximal end and a distal end;

a handle at the distal end for manipulating the shaft; and

5 a circular cylindrical implant bore engaging member having a substantially smooth surface and extending from the proximal end, the engaging member defining a second longitudinal axis inclined relative to the first longitudinal axis, the engaging member being dimensioned for matingly engaging the implant bore set forth below and for manipulating the spinal bone implant set forth below in the plane
10 of the disc space in response to a force on the handle while minimizing stress concentration on the implant;

the implant comprising a body made of bone and having superior and inferior surfaces for bearing against respective adjacent vertebrae defining a disc space therebetween and in movable engagement with the vertebrae in the disc
15 space plane, the body having spaced respective anterior and posterior end surfaces defining an anterior-posterior axis, the body having a smooth surface cylindrical bore in communication with the anterior end surface for receiving the bore engaging member in close complementary engagement to minimize stress concentration on the implant bore, the bore extending between the inferior and
20 posterior surfaces.

34. The combination of claim 33 wherein the bore in the body is at least one of inclined at an angle to the anterior-posterior axis and offset relative to the anterior-posterior axis.

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